Chapter 2

The Chemical Basis of Life

Chapter Objectives

Opening Essay

Explain why an understanding of chemistry and the properties of water are important aspects of biology.

Elements, Atoms, and Compounds

2.1 Define matter, an element, a compound, and a trace element.

2.2 Explain how and why iodine, fluoride, and iron are added to the human diet.

2.3 Distinguish between the size, location, and properties of protons, electrons, and neutrons.

2.3 Define the atomic number and mass number of an atom.

2.3 Define an isotope and explain what makes some isotopes radioactive.

2.4 Describe the uses and dangers of radioactive isotopes.

Chemical Bonds

2.5 Explain how the electron configuration of an atom influences its chemical   
behavior.

2.6–2.8 Distinguish between covalent bonds, nonpolar polar covalent bonds, polar   
covalent bonds, hydrogen bonds, and ionic bonds, noting their relative strengths and how and where they form.

2.9 Explain the significance of chemical reactions. Identify the reactants and   
products of photosynthesis.

Water’s Life-Supporting Properties

2.10–2.13 Describe the special properties of water that make it vital to living systems.   
Explain how these properties are related to hydrogen bonding.

2.10 Define and distinguish between cohesion, adhesion, and surface tension.

2.11 Define and distinguish between heat and temperature. Explain how sweating helps to cool your body.

2.12 Explain why ice floats.

2.13 Define a solute, a solvent, and a solution.

2.14 Explain how acids and bases directly or indirectly affect the hydrogen ion   
concentration of a solution.

2.14 Explain the basis of the pH scale.

2.14 Explain how buffers function.

2.15 Describe the causes and consequences of acid precipitation and ocean   
acidification.

2.16 Explain why the search for extraterrestrial life centers on the search for water.